US Army Corps
of Engineers®
Memphis District

SECTION V

Northwest Tennessee Regional Harbor

MITIGATION PLAN

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Introduction

Several laws, policies, and Executive Orders require the Corps of Engineers to mitigate for all fish and wildlife resources that are impacted by proposed projects. Mitigation includes:

a) Avoiding the impact altogether by not taking a certain action or part of an action;

b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation;

c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;

d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the project;

e) Compensating for the impact by replacing or providing substitute resources or environments. "Replacing" means the replacement of fish and wildlife resources in-kind. "Substitute" means the replacement of fish and wildlife resources out-of-kind. Substitute resources, on balance, shall be at least equal in value and significances as the resource lost.

Recommended Plan

The recommended plan would consist of dredging a channel approximately 9,000 feet long, bottom width of 130 feet transitioning to 225 feet, and a 300-foot turning basin. The design would cover an area of approximately 67 acres and would require approximately 1.02 million cubic yards of dredging. Approximately 30,600 tons of riprap and 15,300 tons of filter material would be used to stabilize the banks. Dredged material would be placed in two different areas. The first site is located landside of the levee (39 acres), and the second area is located in the batture land (66 acres). These areas would also be used for maintenance dredging during the first five years of the project life. Additional areas would be required as needed for future operations and maintenance.

Unavoidable environmental impacts from the Federal project would include the elimination of 60 acres of wetlands at an associated habitat value of 27 AHUV. An additional 14 acres of farmed wetlands would also be impacted.

The local service facilities would be located on an adjacent 77-acre site. Fill would be required to raise the general purpose terminal above the Mississippi River 500-year floodplain in order for the harbor to be usable year round. The surrounding area would be filled above the Mississippi River 100-year floodplain. Fill would be obtained from suitable areas behind the Below Island No. 9 Dikes. Approximately 12 acres of wetlands and 1 acre of farmed wetland would be impacted. The 500 acres of farm land south of the local service facilities would be converted to an industrial area. No

significant impacts to fish and wildlife resources and wetlands are anticipated from industrial development.

Measures Taken to Avoid Impacts

Potential environmental impacts were mitigated by avoiding several significant areas of concern.

Reelfoot Lake

Reelfoot Lake and the surrounding wetlands are nationally significant for several reasons. Reelfoot Lake is the largest natural lake in the state of Tennessee and its unique history of formation by the earthquakes of 1811 and 1812 are well known. Reelfoot Lake is located within the Mississippi Flyway. This area provides valuable habitat for nationally significant migratory waterfowl species. Reelfoot Lake is also nationally significant because of the large number of bald eagles that winter in the area.

Environmental considerations were given top priority throughout the planning of the proposed harbor and associated industrial development. Original plans called for a portion of the industrial area and rail spur to be within the Reelfoot Lake drainage basin. Existing environmental laws regulate industrial operations. However, there is always the chance that industrial accidents could lead hazardous materials entering surface water. This could potentially impact Reelfoot Lake. Therefore, all components that would be necessary for site development, including the industrial area, rail spur, and new roads, were moved out of the Reelfoot Lake drainage basin.

Endangered and Threatened Species

The Federally endangered interior least tern, pallid sturgeon, and Federally threatened bald eagle are known to inhabit the area. A biological assessment (BA) has been completed and concludes that Federally threatened and endangered species would not be impacted by the proposed project if construction can be avoided during critical time periods.

On the Mississippi River, interior least terns occur almost entirely in the lower valley south of Cairo to Vicksburg. They spend 4-5 months at their breeding sites, arriving there from late April to early June. The nest is a shallow and inconspicuous depression in an open, gravelly patch, or exposed flat. Least tern colonies have been observed in the project area below the Island #9 Dikes, across the river at Donaldson Point Dikes, and the Hutchkiss Bend Dikes. It is highly unlikely that harbor construction would impact least terns. However, in order to ensure no impact, proposed dredging would avoid reported nesting and fledging periods. This period is approximately 15 June to 15 August, depending on specific river conditions.

The pallid sturgeon historically was found in the middle and lower Mississippi River, the Missouri River, and the lower reaches of the Platte, Kansas, and Yellowstone

Rivers. Pallid sturgeon require large, deep, turbid, free-flowing rivers with sand or rocky substrates. Pallid sturgeon have been captured in tributary mouths, over sandbars, along main channel borders, and in deep holes. Cates Landing backwater does not conform to the characteristic swift water, channel habitats occupied by juvenile and adult pallid sturgeon. Based on apparent reproductive conditions of adults, the spawning season is believed to be during spring, initiation dependent upon latitude and timing of proximate cues like spring runoff. It is presumed to take place during high water. Spawning probably begins in March in the lower Mississippi and Atchafalaya Rivers, late April or early May in the lower Missouri and middle Mississippi Rivers, and late May or early June in the upper Missouri River. It is highly unlikely that harbor construction would impact pallid sturgeon. In order to ensure no impact, proposed dredging would avoid reported spawning periods of the middle Mississippi River (12 April to 30 June).

Dredge Disposal

Original plans called for the 1.02 million cubic yards of dredged material to be disposed in areas of the Mississippi River. This is a common practice for maintenance dredging activities and sand and gravel operations that occur in the vicinity of the project. Concerns were expressed early on in the planning process of the potential impacts to aquatic resources from disposing the dredged material back into the Mississippi River. The potential impact to aquatic resources has been avoided by placing the 1.02 million cubic yards of dredged material on land adjacent to the harbor.

Measures Taken to Minimize Impacts

Potential environmental impacts were mitigated by minimizing the project area and adding several features.

Wetland Loss

Original plans called for a 14,000-foot harbor extending up to Cates Landing (Alternative 1). Cates Landing is located directly on the Mississippi River and naturally occurs above the Mississippi River 500-year floodplain. This area would be an ideal location to place general service facilities (mooring cells, berthing areas, on/off loading equipment, rail, and roads). The area is ideal because it allows for year-round access to the harbor. Other harbors, in which general service facilities are not at this height, frequently have to delay operations during high or low water because of barges not being able to fit under on/off loading equipment, or the harbors bring in fill material during construction to raise the local service facilities. No fill would have been required at Cates Landing, thus it would have been inexpensive to construct the general service facilities.

However, alternative 1 would have impacted 151 acres of vegetated wetlands and 16 acres of farm wetlands. The loss of 151 acres of wetlands was unacceptable. Therefore, alternative 4 was developed that would minimize impacts to wetlands. Alternative 4 would have only dredged a 5,000-foot long harbor and impact 20 acres of wetlands and two acres of farm wetlands. However, significant quantities of fill would

be required to raise the general service facilities above the Mississippi River floodplain to make the harbor usable. The associated costs with the extra fill needed for the general service terminal was excessive.

Alternative 5 was recommended because it offered the best compromise between wetland losses and costs associated with fill needed for the general service terminal, while still producing positive net benefits. Alternative 5 would impact 60 acres of wetlands and 14 acres of farmed wetlands.

Measures Taken to Compensate Impacts

The Habitat Evaluation System (HES) was used to quantify impacts to fish and wildlife resources from project construction. Unavoidable environmental impacts from the Federal project would include the elimination of 60 acres of wetlands at an associated habitat value of 27 AHUV. An additional 14 acres of farmed wetlands would also be impacted. The general service terminal would impact an additional 12 acres of wetlands and one acre of farm wetland. Compensatory mitigation would include replacing the associated loss to fish and wildlife resources and wetlands in kind at a suitable area. The HES was used to determine compensatory mitigation.

Location

It was determined that compensatory mitigation would have to take place within the State of Tennessee and must be purchased in fee from willing sellers only. A matrix was developed to determine potential mitigation areas by utilizing a Geographic Information System. Potential mitigation tracts were calculated based on the following criteria:

1. **Located within the Mississippi River Batture Areas or Floodplain**

   Project related impacts are taking place on areas that are frequently flooded by the Mississippi River. In order to maintain hydrology and ensure no net loss of wetlands, the area must be flooded by the Mississippi River periodically. The levee system prevents flooding. There are additional areas within Tennessee that are not protected by a levee. There are approximately 331,800 acres within the Mississippi River batture area or floodplain.

2. **Farm land within the Mississippi River batture area or floodplain**

   Utilizing farm land for potential mitigation tracts is a common practice in the region. Much of the farm land within these areas is prior converted farm land. These areas would most likely be composed of hydric soils that would be conducive to wetland mitigation. There are approximately 94,000 acres of farmland located within the batture areas or floodplain.

3. Frequently Flooded Areas

Annual flooding from the Mississippi River on a potential mitigation tract would ensure that adequate fish spawning areas are adequately mitigated. Agricultural areas within the batture area or floodplain that are flooded, ponded, or saturated for 5 percent of the growing season were mapped during the Mississippi River Mainline Levees Enlargement (MRL) Environmental Impact Statement (USACE, 1998). Elevations that correlated to the 5% flooded criteria were calculated from existing gauge data and entered into a GIS database from satellite imagery depicting a flood event. There are approximately 73,000 acres that meet the criteria of frequently flooded, farm land, in the Mississippi River batture area or floodplain.

4. Lands Located Adjacent to Existing National Wildlife Refuges or Wildlife Management Areas

Planting bottomland hardwoods on areas that are currently under the management of the National Wildlife Refuge (NWR) system or State of Tennessee Wildlife Management Area (WMA) would enhance the overall habitat of the entire area. Areas under management would not be cleared for development or agricultural purposes. Therefore, tracts of mitigation adjacent to these areas would enhance the overall available habitat to the region. GIS data with areas of NWR and WMA lands were obtained from the Tennessee Field Office of the U.S. Fish and Wildlife Service and the Tennessee Wildlife Resources Agency, respectively. There are approximately 161,225 acres of managed land within the counties bordering the Mississippi River. Approximately 9,000 acres of potential mitigation tracts were identified that were within one mile of NWR or WMA lands.

5. Lands Adjacent to Bottomland Hardwoods

Planting bottomland hardwoods (BLH) adjacent to tracts of existing bottomland hardwoods would provide valuable wildlife corridors along the Mississippi River for a variety of wildlife including migratory songbirds. Cover type data within the Mississippi River floodplain was calculated during the MRL EIS. All of the previous tracts of lands identified are within one mile of BLH.

6. Management Potential

Management of the mitigation tract would be required to ensure success of the plantings. There are several tracts of land that are within the State of Tennessee and meet the above criteria but are located west of the Mississippi River. Management of these areas would be difficult. Therefore, only lands that are east of the Mississippi River would serve as potential mitigation.

Approximately 9,000 acres of farm land has been identified for potential mitigation area (Figure 1). Actual tracts of land would be purchased from willing sellers during the development of plans and specifications. Coordination with applicable resource agencies and stake holders would be maintained throughout the mitigation process to ensure success.

Mitigation Alternatives

The HES was used to determine habitat values of several mitigation alternatives to compensate for the loss of 27 AHUV from project construction. Planting bottomland hardwoods on prior converted farm land is a common mitigation practice in the project area. Hydrology may have to be restored in order to ensure success. Several alternatives were considered to determine the recommended mitigation plan to offset project impacts.

A. Purchase land only and allow natural plant succession.

Suitable tracts of prior converted farm land would be purchased and vegetation would be allowed to become established naturally. It is expected that black willow (*Salix nigra*) would become established very early (within 5 years) with cottonwood (*Populus deltoids*) beginning to appear by year 15. Black willow and cottonwood would be the dominant vegetation over the life of the project (50 years). The site would be monitored to ensure success.

B. Purchase land and plant with black willow

Suitable tracts of prior converted farm land would be purchased and black willow would be planted. Black willow is very prolific and plantings can consist of live stakings. Sources of black willow are plentiful in the project area. The area would require monitoring to ensure success.

C. Purchase land and plant high habitat valued bottomland hardwood seedlings

Suitable tracts of prior converted farm land would be purchased and high habitat valued bottomland hardwood seedlings that are tolerant to flooding would be planted. Tree seedlings would be planted on 10-foot centers at a rate of 436 seedlings per acre. Trees to be used would include very tolerant to flooding species including overcup oak (*Quercus lyrata*), Nuttal oak (*Quercus nuttalli*), and water hickory (*Carya aquatica*); tolerant species including pin oak *(Quercus palustris*); and somewhat tolerant species including willow oak (*Quercus phellos*), and water oak (*Quercus nigra*). Black willow would periodically have to be cleared and the site monitored to ensure success.

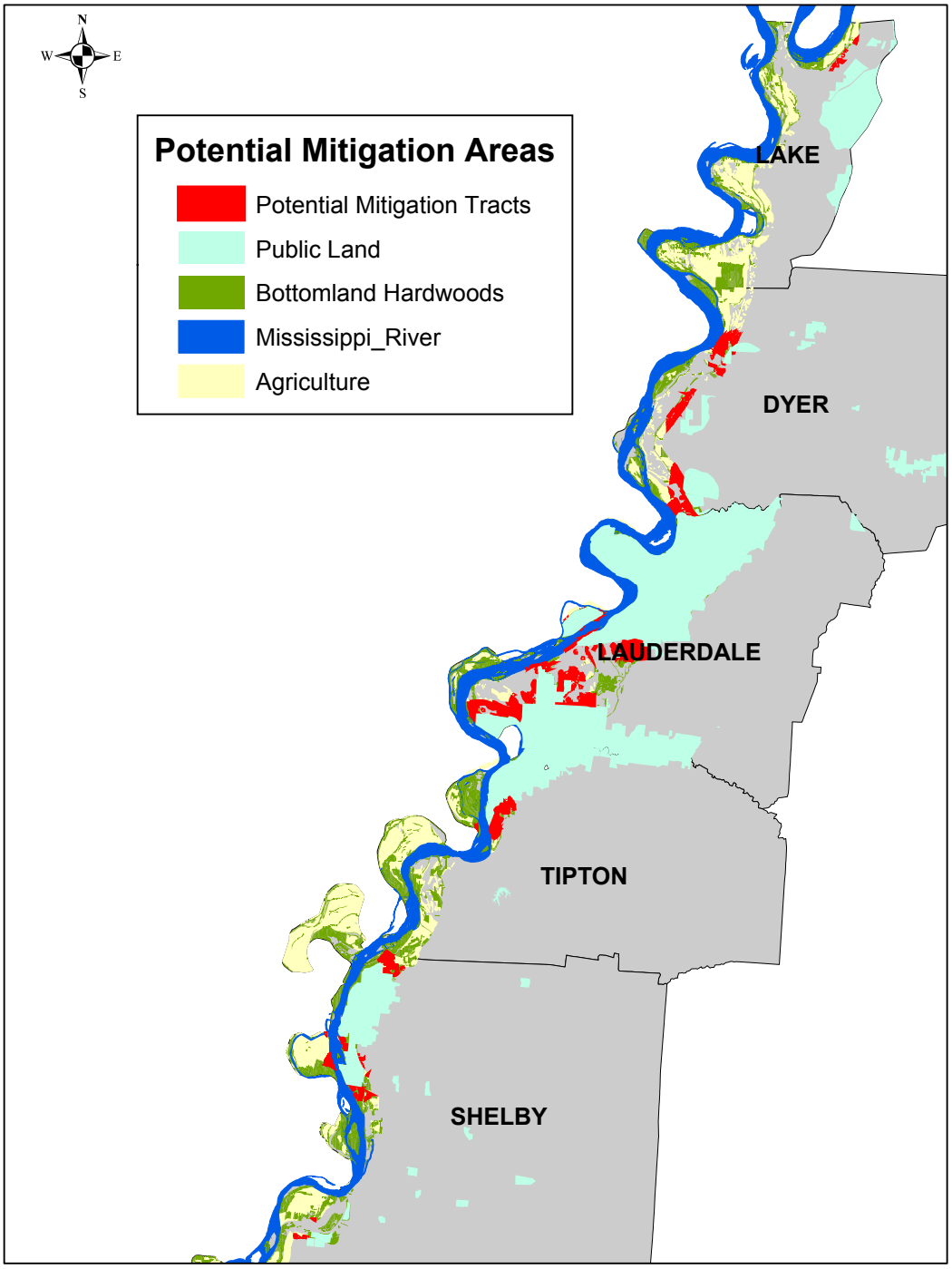

Figure 1. Potential mitigation areas, NW TN Regional Harbor Study.

D. Purchase land and plant a mixture of high/low habitat valued bottomland hardwoods

Alternative D would be the same as Alternative C except additional species would be added to increase the diversity of the stand. Additional species to be used would include very tolerant species including green ash (*Fraxinus pennsylvanica*); tolerant species including sugarberry (*Celtis laevigata*), hackberry (*Celtis occidentalis*), and sweetgum (*Liquidamber styraciflua*); and tolerant species including silver maple (*Acer saccharinum*), box elder (*Acer negundo*), river birch (*Betula nigra*), and sycamore (*Platanus occidentalis)*.

E. Purchase land, create topography, and plant with a mixture of high/low habitat valued bottomland hardwood (Recommended Mitigation Plan)

Much of the prior converted farm land in the area has been leveled to increase agricultural production. Different species of trees require different rates of inundation. Alternative E would be the same as Alternative D except, prior to planting low areas would be randomly excavated and spoil piles placed at random heights throughout the tract of land. Certain species of trees would be planted according to elevation and frequency of inundation. The creation of topography would also enhance the diversity of the fish and wildlife resources that would utilize the area. Black willow would have to be cleared periodically and the site monitored to ensure success.

Selection of the Recommended Mitigation Alternative

Table 1 provides the predicted AHUV values for a one acre tract of agricultural land for each alternative over the life of the project (50 years). The acreage of mitigation required was determined by:

$$\text{Required Mitigation (acres)} = \frac{\text{Lost AHUV from construction}}{\text{Gained AHUV from 1-acre mitigation tract}}$$

Table 1.
Expected HQI and AHUV for various mitigation alternatives on a 1-acre tract of frequently flooded farm land.

Mitigation Alternative	Management AHUV	Mitigation (acres)
A	0.135	208
B	0.170	159
C	0.195	138
D	0.213	127
E	0.225	120

Alternative E was selected as the recommended mitigation plan because it would offer the highest habitat value over the project life, offer the highest amount of plant and animal diversity, and require the least amount of land.

The loss of 27 AHUV from the Federal project would be mitigated by planting bottomland hardwoods and creating topography on 120 acres of prior converted farm land. An additional 14 acres of bottomland hardwoods would be planted to mitigate for the loss of 14 acres of farm wetland. Therefore, a total of 134 acres would be planted in bottomland hardwoods to compensate for the loss to fish and wildlife resources from harbor construction.

The non-Federal portion of the project would impact 12 acres of vegetated wetlands and 1 acre of farm wetlands. The loss of 12 acres of wetlands would be mitigated at a ratio of 2:1, and the loss to 1 acre of farm wetland would be mitigated at a ratio of 1:1. Therefore, 25 acres of mitigation would be required from site development.

The total project (Federal and non-Federal) would require planting bottomland hardwoods and creating topography on 159 acres of farm land. Mitigation would take place concurrent with harbor construction and site development. The tract of land would be monitored annually for five years to ensure success.